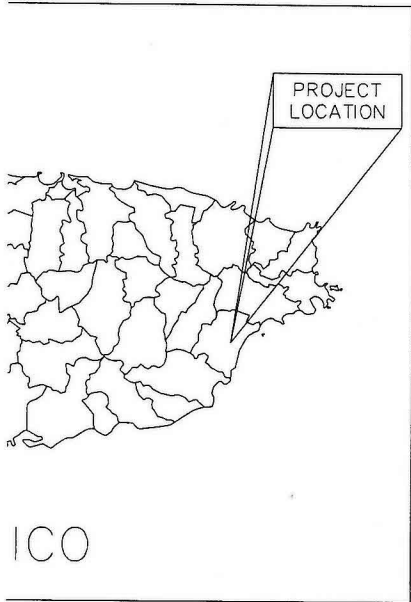


## ***Appendix I***

### ***As-Built Plans and Detail Sections of the Biopile***



SOURCE: U.S.G.S. TOPOGRAPHIC MAP,  
7.5 MINUTE SERIES, HUMACAO, PUERTO  
RICO QUADRANGLE, 1967

ON MAP

SITE LOCATION MAP  
SCALE 1: 20,000

# DIATION PROJECT E BUILDING 5 AREA BIOPILE TO RICO



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Approved by

Customer Representative mm/dd/yy

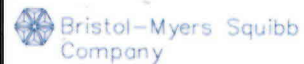
Draftler mm/dd/yy

Project Manager mm/dd/yy

Engineering Manager mm/dd/yy

Quality Assurance mm/dd/yy

1	DATE	REVISION	BY
Rev A	date	Description	by



Title: COVER SHEET

Project: SOIL REMOVAL AND  
REMEDATION

Location: HUMACAO  
PUERTO RICO

JOB NUMBER: 0000000000 SHEET #: G-001  
DATE: 05/1/00  
SCALE: NONE  
PRJ MGR: D.LINDSTRAND CAD FILE NAME  
DESIGNER: D INITIALS  
VENDOR NAME:  
VENDOR PROJECT NUMBER:  
AUTHOR:

DISCIPLINE:

SYSTEM:

SYSTEM #:

EQUIPMENT:

IS APPROVED

PROJECT NAME

DOCUMENT TYPE

DATE OF REVIEW

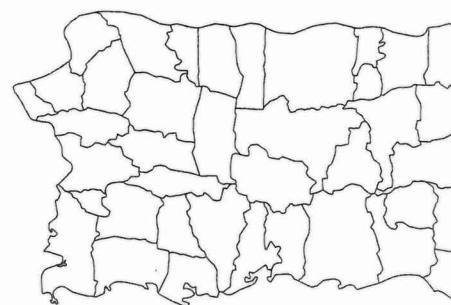
REVISIONS

REVISIONS





Bristol-Myers Squibb  
Company



PUERTO

REGIONAL LOC  
NTS

# SOIL REMOVAL AND REM INTERIM CORRECTIVE MEASU AREAS D, E, AN HUMACAO, PUE

## DESCRIPTION OF CONTENTS

DRAWING NUMBER	TITLE
G-001	COVER SHEET
G-002	CONSTRUCTION SEQUENCE
G-101	SITE PLAN
G-102	PROJECT AREA PLAN
G-003	SOIL EROSION AND SEDIMENT CONTROL
S-101	STRUCTURAL PLAN AND DETAILS
C-101	FENCE DETAILS
H-101	EXCAVATION PLAN
P-101	BIOPILE PLAN
P-102	BIOPILE SECTION AND DETAILS
P-103	BIOPILE GAS SAMPLING PROBES
H-501	RESTORATION PLAN
P&ID-001	PROCESS AND INSTRUMENTATION DIAGRAM

LATION - THE CONTRACTOR SHALL INSTALL TEMPORARY FENCING WITHIN THE PROJECT AREA FOR THE PURPOSE OF SECURITY AND LIMITING AREA ACCESS AS SHOWN

CONTRACTOR SHALL CONSTRUCT A NEW BIOPILE

IATION) - THE CONTRACTOR SHALL PERFORM A SOIL REMEDIATION ON CONTRACT DRAWINGS AS AREA D AND AREA E AS SHOWN ON DRAWING H-101. FORM THE FOLLOWING WORK ACTIVITIES:  
TE (STOCKPILE) ASPHALT PAVING (AND SUB-BASE), CONCRETE SLABS AND CURBS, CONTRACTOR SHALL ALSO REMOVE AND SEGREGATE IMPACTED SOIL (SOIL CONTAINING ION OF HAZARDOUS CONSTITUENTS) FROM AREA D AND AREA E. THE STOCKPILE MATERIALS WITHIN THE PROJECT AREA INTO FOUR GROUPS: OFF-SITE DISPOSAL, 2.) CLEAN SOIL FOR RE-USE AS BACKFILL, 3.) IMPOSED OFF-SITE IN A "SPECIAL WASTE" LANDFILL, AND 4.) IMPACTED THE BIOPILE. THE OWNER OR OWNER'S REPRESENTATIVE WILL BE DIFFERENTIATING IMPACTED SOIL TO BE DISPOSED AND IMPACTED SOILS

L FURNISH AND INSTALL CLEAN FILL MATERIAL TO REPLACE DISPLACED ED FROM AREA D AND AREA E. CLEAN FILL SHALL CONSIST OF QUARRIED STONE S "MOGOLLA" THAT COMPLIES WITH THE PROJECT SPECIFICATIONS.

L BE RESPONSIBLE FOR THE MANAGEMENT OF WATER GENERATED AS IL EXCAVATION ACTIVITIES. THE CONTRACTOR SHALL PROVIDE A JACK FOR COLLECTING AND TRANSPORTING WATER AS REQUIRED. THE NSIBLE FOR DISPOSAL OF TREATED WATER AT THE OWNER'S ATMENT FACILITY. THE OWNER SHALL PROVIDE A TRANSFER STATION Y FOR RECEIVING WASTEWATER AS PUMPED BY THE VACUUM TRUCK RACTOR.

CTOR SHALL CONSTRUCT NEW BIOPILE PIPING AS SHOWN  
THE PROPOSED NEW BIOPILE SHALL INCLUDE:  
- THE CONTRACTOR SHALL INSTALL NEW LEACHATE COLLECTION PIPING AS DRAWINGS.  
CONTRACTOR SHALL INSTALL NEW AERATION PIPING AS SHOWN IN 3.

INTRACTOR SHALL PROVIDE AND INSTALL A NEW BIOPILE COVER LINER ECT DRAWINGS.

E CONTRACTOR SHALL BE RESPONSIBLE FOR RESTORING SECURITY FENCING ONDITION. TEMPORARY FENCING SHALL BE REMOVED.



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Approved by

Technical Representative 04/10/12

04/10/12

Project Manager 04/10/12

Coordinating Manager 04/10/12

Quality Assurance 04/10/12

DATE	04/10/12	REVISION	00
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## CONSTRUCTION SEQUENCE

PROJECT SOIL REMOVAL AND REMEDIATION

TOTAL 00








DATE	04/10/12	SHEET #	G-002
SCALE		CAD FILE NAME	
PROJ. NO.			
DESIGNED			
DRAWN			
CHECKED			
APPROVED			
DISCIPLINE			
SYSTEM			
SYSTEM #			
DESCRIPTION			





## CONSTRUCTION SEQUENCE

1. PRE-MOBILIZATION AND GENERAL PROJECT REQUIREMENTS - FOLLOWING PROJECT AWARD, THE CONTRACTOR SHALL FURNISH SUBMITTALS FOR THE OWNERS REVIEW AND APPROVAL. SUBMITTALS SHALL INCLUDE:
  - A. THE PREPARATION FOR THE OWNER'S APPROVAL A SITE SPECIFIC HEALTH AND SAFETY PLAN. THE HEALTH AND SAFETY PLAN SHALL BE PREPARED AND MAINTAINED IN ACCORDANCE WITH THE COMMONWEALTH OF PUERTO RICO AND FEDERAL RULES AND REGULATIONS FOR THE REMEDIATION OF SOILS CONTAINING A HAZARDOUS WASTE. THIS PLAN SHALL INCLUDE DESIGNATION OF ZONES WITHIN THE PROJECT AREA AS EXCLUSION ZONES, CONTAMINATION REDUCTION ZONES, AND SUPPORT ZONES.
  - B. PROJECT AREA SECURITY - THE CONTRACTOR SHALL COORDINATE IN ADVANCE WITH THE OWNER'S SITE SECURITY THE REMOVAL AND ALTERATION OF THE SECURITY FENCING WITHIN, AND ADJACENT TO, THE PROJECT AREA. THE CONTRACTOR SHALL ALSO OBSERVE AND ENFORCE ACCESS TO HAZARDOUS WASTE OPERATIONS WORK ZONES IN ACCORDANCE WITH THE CONTRACTOR'S SITE SPECIFIC HEALTH AND SAFETY PROGRAM.
  - C. THE OWNER HAS OBTAINED AN EARTH CRUST REMOVAL PERMIT (*EXTRACCION DE MATERIALES DE LA CORTEZA TERRESTRE*) FROM THE COMMONWEALTH OF PUERTO RICO'S DEPARTMENT OF NATURAL AND ENVIRONMENTAL RESOURCES. THIS PERMIT RESTRICTS THE HOURS OF SOIL EXCAVATION AND SOIL MOVEMENT BETWEEN 6AM AND 6PM AND LIMITS ON THE DAYS OF THE WEEK. NO EXCAVATION OR SOIL MOVEMENT IS PERMITTED ON SUNDAY.
2. MOBILIZATION - THE CONTRACTOR IS PERMITTED TO PROVIDE A TEMPORARY OFFICE (CONTRACTOR TRAILER OR TOOL TRAILER) WITHIN THE PROJECT AREA AS SHOWN ON THE CONTRACT DRAWINGS.
3. ENVIRONMENTAL CONTROLS - THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND MAINTAINING ENVIRONMENTAL CONTROL PROGRAMS TO INCLUDE:
  - A. CONTROL OF SOIL EROSION AND PROTECTION OF STORMWATER CONVEYANCE SYSTEMS FROM SEDIMENTATION. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN SOIL EROSION AND SEDIMENTATION CONTROL IN ACCORDANCE WITH DRAWING G-003.
  - B. PROTECTION OF THE BIOPILE STORMWATER COLLECTION SUMP - THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE BIOPILE STORMWATER COLLECTION SUMP DURING THE PROJECT TO INCLUDE PROTECTING THE SUMP FROM STORMWATER RUNOFF FROM IMPACTED SOIL. THE CONTRACTOR SHALL PROTECT THE SUMP BY THE INSTALLATION OF A REMOVABLE PLUG IN THE CATCH BASIN OUTLET PIPE. AT THE CONCLUSION OF REMEDIAL ACTIVITIES, THE CONTRACTOR SHALL BE RESPONSIBLE FOR DECONTAMINATION OF THE BIOPILE CATCH BASIN AND REMOVAL OF THE PLUG.
  - C. CONTROL OF ODORS. THE CONTRACTOR SHALL PROVIDE AND USE ODOR SUPPRESSING FOAMS, COVERS, AND ADMINISTRATIVE CONTROLS TO MINIMIZE ODORS AT THE PROJECT AREA PERIMETER.
4. TEMPORARY FENCING AND A NEW SECURITY ON DRAWING H-101.
5. BIOPILE CONSTRUCTION
6. EXCAVATION OF SOIL WITHIN THE AREA DESIGNATED BY THE CONTRACTOR SHALL:
  - A. REMOVE AND SCREEN AND CLEAN SOIL AND ELEVATED CONTAMINANTS. THE CONTRACTOR SHALL (1.) PAVING DEBRIS IMPACTED SOIL SOIL TO BE TREATED RESPONSIBLE FOR TO BE TREATED
  - B. THE CONTRACTOR SHALL IMPACTED SOIL DESIGNATED LOCATIONS
  - C. THE CONTRACTOR SHALL A CONSEQUENCE DEDICATED VACUUM OWNER SHALL HAZARDOUS WASTE AT THE OWNER PROVIDED BY T
7. BIOPILE PIPING - THE CONTRACTOR SHALL IN THE CONTRACT DRAWINGS
  - A. LEACHATE COLLECTION
  - B. AERATION SYSTEMS
  - C. BIOPILE COVERINGS AS SHOWN IN DRAWING
8. RESTORATION OF SOIL TO ITS PRE-REMEDIATION CONDITION

-  ADMINISTRATION
-  PHARMACEUTICAL
-  BULK CHEMICAL
-  LABORATORIES
-  PROJECTED CONSTRUCTION
-  GREEN AREAS
-  PIPERACK



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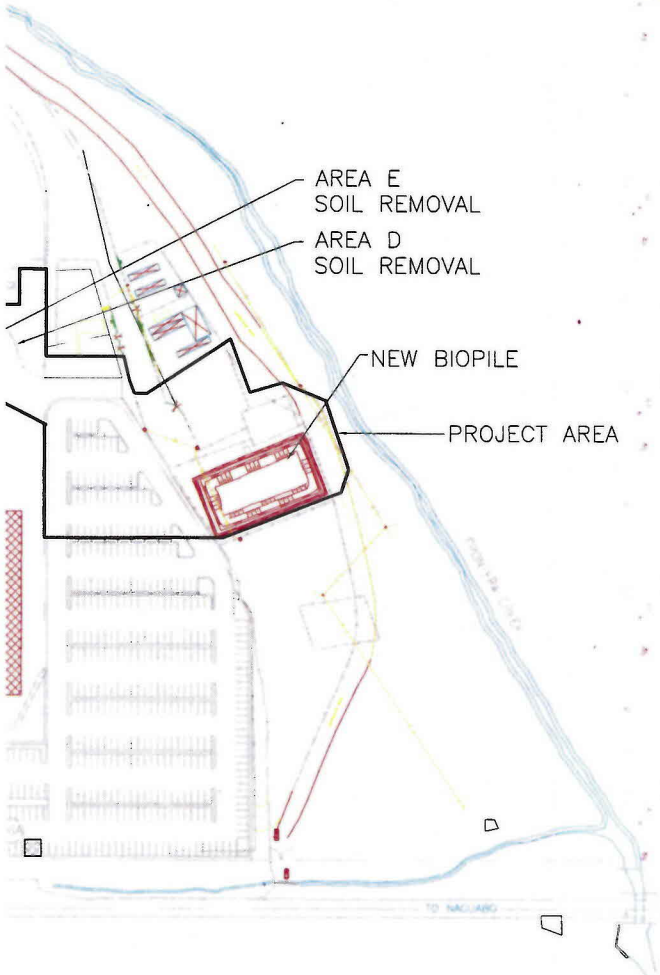
Customer Representative mm/dd/yy

Drafter mm/dd/yy

Project Manager mm/dd/yy

Engineering Manager mm/dd/yy

Quality Assurance mm/dd/yy



SCALE IN FEET  
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(RTO)

Rev.	date	description	by
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Bristol-Myers Squibb Company

Title SITE PLAN

Project SOIL REMOVAL AND REMEDIATION

Location:

DATE: 04/10/12 SHEET #: G-101

SCALE: CAD FILE NAME

DESIGNER:  
VENDOR NAME:  
VENDOR PROJECT NUMBER:

AUTHOR:

DISCIPLINE:

SYSTEM:

SYSTEM #:

EQUIPMENT:



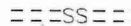
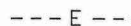
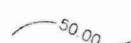










### LEGEND

- |                                       |                              |                                     |                                   |
|---------------------------------------|------------------------------|-------------------------------------|-----------------------------------|
| 1-FORMER PROCESS BLDG.                | 16A-FIRE WATER PUMP HOUSE    | 26-DEWATERING BLDG.                 | 46A-SANITARY SEWER MONITORING STA |
| 2-FORMER PROCESS BLDG.                | 16B-FIRE WATER PUMP TANK     | 27-FORMER CALORIC-I INCINERATOR     | 46B-STORM SEWER PUMPING/MONITOR   |
| 3-FORMER PROCESS BLDG.                | 17-QUALITY CONTROL BLDG.     | 28-                                 | 47-FORMER REGENERATIVE THERMAL    |
| 4-FORMER PHARMACEUTICAL BLDG.         | 18-T.O.D. & PILOT PLANT LAB. | 29-FORMER PROCESS BLDG.             | 48-FORMER THERMAL OXIDIZER UNITS  |
| 5-BULK PROCESS BLDG.                  | 19-TEMPORARY LAB. FACILITIES | 30-ENG. & MAINT. OFFICE             |                                   |
| 6-PHARMACEUTICAL BLDG.                | 20-FIRE WATER LAGOONS        | 31-SPILL COLLECTION SYSTEM          |                                   |
| 7-ADMINISTRATION BLDG.                | 21-ELECTRICAL SUB-STATIONS   | 32-COOLING TOWERS                   |                                   |
| 8-UTILITIES BLDG.                     | A-38 KVA MAIN SUB-STATION    | 34-DRUM MANAGEMENT FAC.             |                                   |
| 9-FORMER WAREHOUSE & TRAINING ROOM    | A'-BLDG. NO. 29              | 36-TRANE INCINERATOR                |                                   |
| 10-DRUM STORAGE BLDG.                 | B-BLDG. NO. 5                | 37-WAREHOUSE BLDG.                  |                                   |
| 11-SOLV. REC. CONTROL BLDG.           | C-WASTE TREATMENT            | 38-FORMER ENG. & MAINT. SHOP/OFFICE |                                   |
| 12-FORMER SPARE PARTS WAREHOUSE BLDG. | D-Q.C. & LLVE. BLDG.         | 39-FORMER CALORIC-II INCINERATOR    |                                   |
| 13-WASTE TREATMENT LAB. BLDG.         | E-SALTY WASTE INCINERATOR    | 40-FORMER SOLID INCINERATOR         |                                   |
| 14-WEST GUARD HOUSE                   | F-BLDG. NO. 1                | 41-PHARMACEUTICAL BLDG.             |                                   |
| 15-EAST GUARD HOUSE                   | G-C.T. & CHILLER AREA        | 42-DRUM STORAGE FACILITIES          |                                   |
| 15A-NORTH GUARD HOUSE                 | 23-FORMER SOLVENT TANK FARM  | 43-RECYCLING COLLECTION BUILDING    |                                   |
|                                       | 24-FORMER TANK FARM DIKES    | 45A-EAST SIDE COOLING TOWERS        |                                   |
|                                       | 25-WATER WELLS               | 45B-WEST SIDE COOLING TOWERS        |                                   |
|                                       | 25.6-DRUM STORAGE            |                                     |                                   |
|                                       | 25.7-BLDG. NO. 7             |                                     |                                   |
|                                       | 25.8-BLDG. NO. 6             |                                     |                                   |
|                                       | 25.10-BLDG. NO. 9            |                                     |                                   |
|                                       | 25.12-NORTH EAST PLANT       |                                     |                                   |

# LEGEND:

-  NEW TEMPORARY FENCE
-  CHAIN LINK FENCE
-  STORM SEWER LINE
-  UNDERGROUND ELECTRICAL CONDUIT
-  CONTOUR LINE
-  ORNAMENTAL POLE / LUMINARY
-  MANHOLE
-  CLEAN-OUT
-  POST INDICATOR VALVE
-  CATCH BASIN
-  SPOT ELEVATION

WEATHER STATION

NEW BIOPILE

CONTRACTORS PARKING LOT

## NOTES

- 1- ALL DISTANCES AND ELEVATIONS ARE IN FEET.
- 2- BENCHMARK ELEVATION ON TOP OF SURVEY PK-NAIL/WASHER LOCATED AT EAST SIDE OF BUILDING NO.18, ON TOP OF CONCRETE SWALE. ELEVATION 18.071 FEET.
- 3- HORIZONTAL AND VERTICAL CONTROL REFERRED TO BRISTOL-MYERS SQUIBB PLANT SYSTEM.
- 4- THE TOPOGRAPHIC WAS SHOWN IN SPOT ELEVATION AND CONTOUR LINE WITH INTERVAL AT 1.00 FOOT.
- 5- ALL DRAWING AND CALCULATION FOR THIS MAP WERE DONE USING AUTOCAD FOR WINDOWS RELEASE 2004 AND SURVCADD FOR WINDOWS RELEASE 2004.

0 30 60  
SCALE IN FEET



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Approved by

Customer Representative: mm/08/02  
 Station: mm/08/02  
 Project Manager: mm/08/02  
 Engineering Manager: mm/08/02  
 Quality Assurance: mm/08/02

Rev. Date Description

Bristol-Myers Squibb Company

PROJECT AREA PLAN

PROJECT SOIL REMOVAL AND REMEDIATION

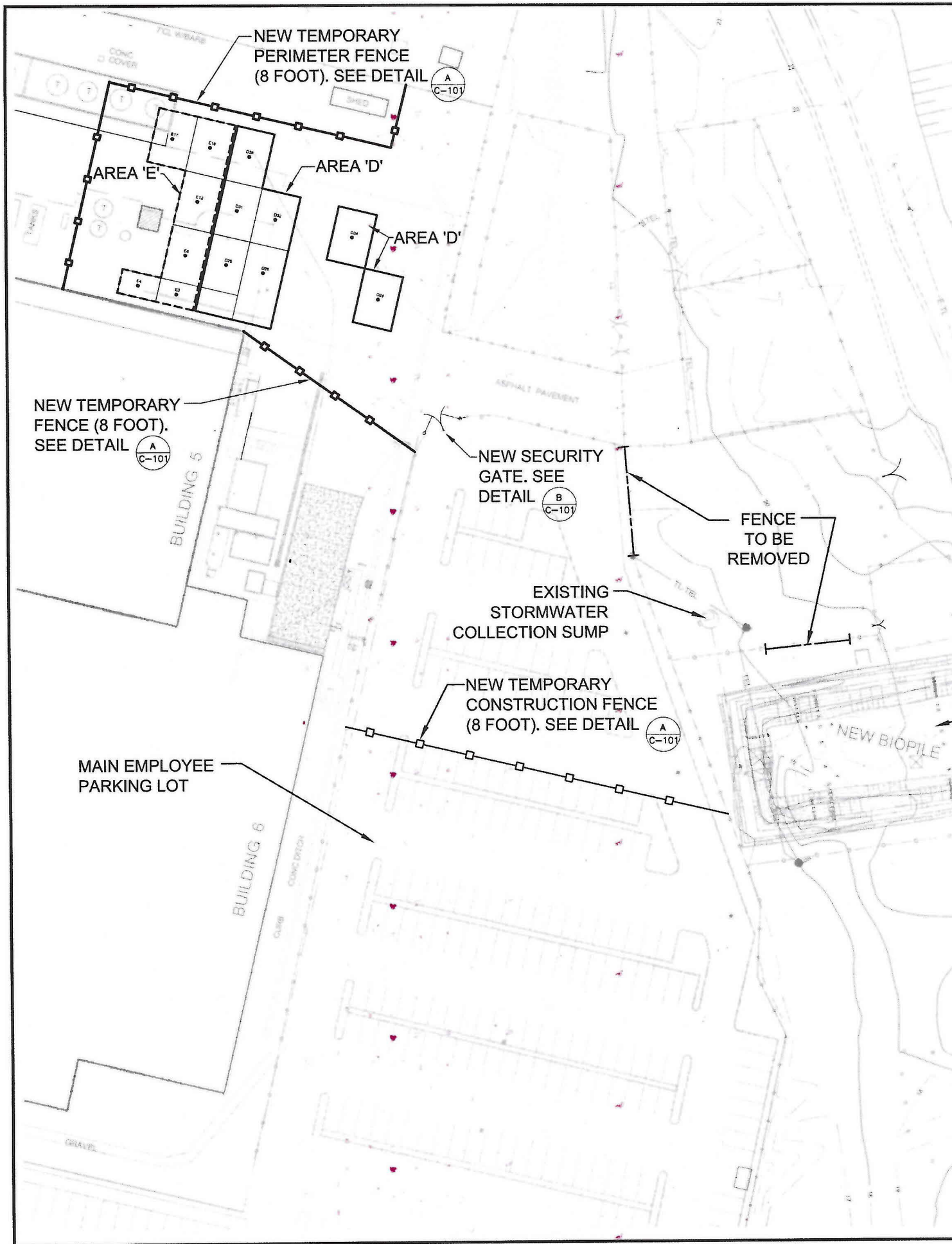
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 SCALE  
 PRJ. MGR.  
 DESIGNER  
 VENDOR NAME  
 VENDOR PROJECT NUMBER  
 AUTHOR  
 DISCIPLINE  
 SYSTEM  
 SYSTEM #  
 EQUIPMENT

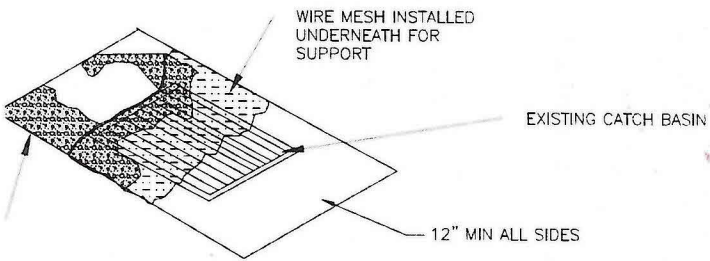
SHEET #  
G-102

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## DRAINAGE FILTER DETAIL

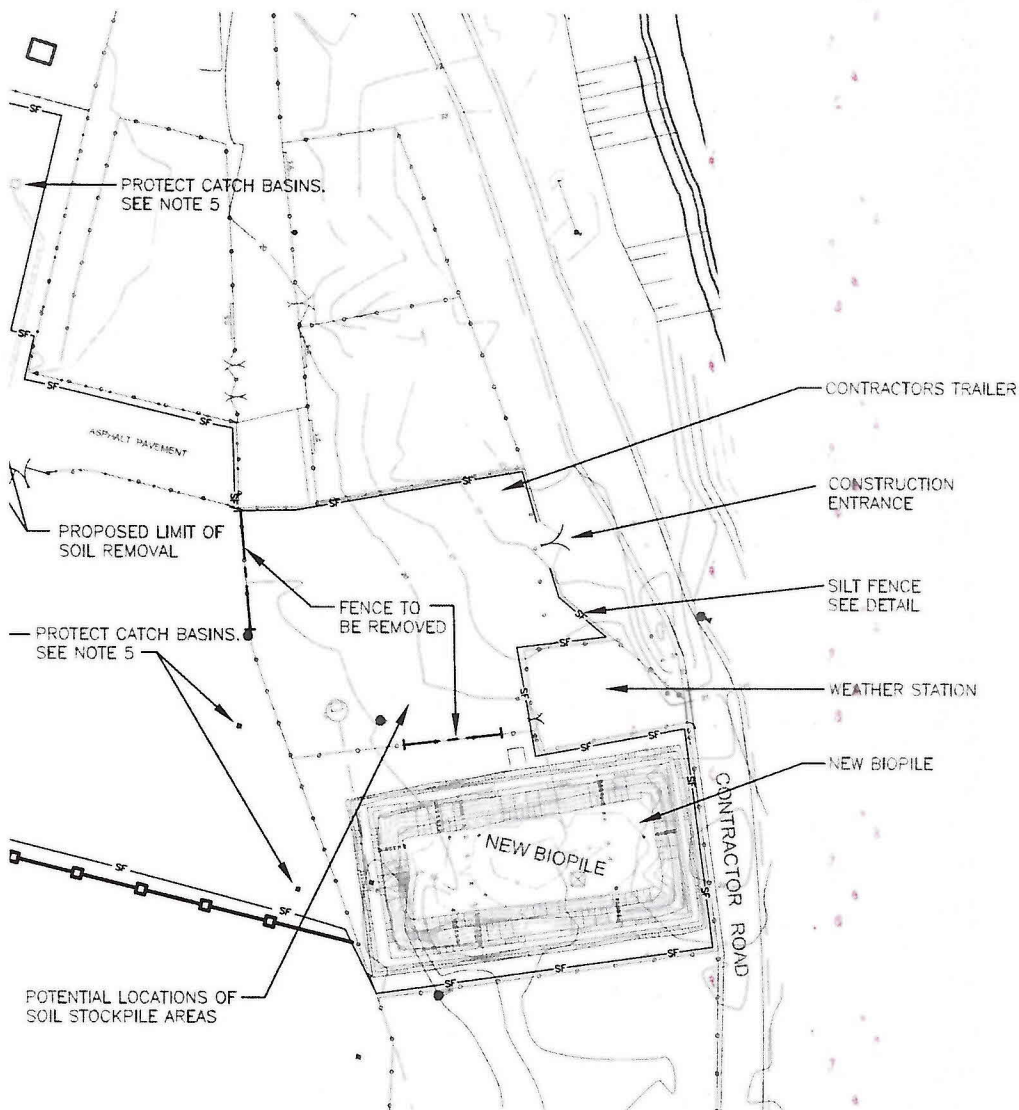
BRIC AND WIRE MESH WITH 1/2" OPENINGS WILL BE PLACED OVER EXISTING AND GRATE SO THAT AT LEAST 12 INCHES OF FABRIC AND WIRE TENDS BEYOND ALL EDGES OF THE EXISTING CATCH BASIN. FILTER FABRIC WILL ALSO BE REINFORCED WITH PROPERLY INSTALLED HAY BALES.

FOR WILL CLEAN FILTER FABRIC AFTER EVERY STORM EVENT OR WHEN COMES CLOGGED.

BRIC AND WIRE MESH TO BE INSTALLED IN SIMILAR FASHION FOR INLETS GRATE.

7 FILTER WILL BE INSTALLED PRIOR TO ANY EXCAVATION AND WILL REMAIN TEMPORARY PAVEMENT IS COMPLETED.

4" OPENING SHALL SAFELY PASS FLOWS GREATER THAN THE 1 YEAR, 24 HOUR STORM EVENT.



0 40 80  
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Customer Representative nm/cd/yy

Drafter nm/cd/yy

Project Manager nm/cd/yy

Engineering Manager nm/cd/yy

Quality Assurance nm/cd/yy

Rev	date	description	by
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Bristol-Myers Squibb Company

Title: SOIL EROSION AND SEDIMENT CONTROL

Project: SOIL REMOVAL AND REMEDIATION

Location:

DATE: 04/10/12  
SCALE  
PRJ MGR  
DESIGNER  
VENDOR NAME:  
VENDOR PROJECT NUMBER:  
AUTHOR:  
DISCIPLINE:  
SYSTEM:  
SYSTEM #:  
EQUIPMENT:

SHEET #:  
G-003

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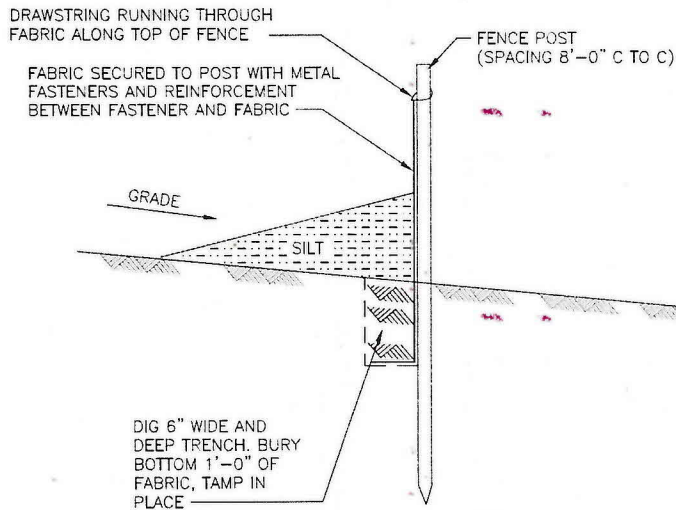


## SOIL EROSION AND SEDIMENT CONTROL NOTES:

1. ALL SOIL EROSION AND SEDIMENT CONTROL PRACTICES WILL BE INSTALLED IN ACCORDANCE WITH THE LOCAL STANDARDS FOR SOIL EROSION AND SEDIMENT CONTROL, AND IN PROPER SEQUENCE, BEFORE SITE DISTURBANCE BEGINS, AND MAINTAINED UNTIL PERMANENT STABILIZATION IS ESTABLISHED.
2. THE SITE SHALL AT ALL TIMES BE GRADED AND MAINTAINED SUCH THAT ALL STORM WATER RUNOFF IS DIVERTED TO SOIL EROSION AND SEDIMENT CONTROL FACILITIES.
3. A CRUSHED STONE, VEHICLE WHEEL-CLEANING CONSTRUCTION ENTRANCE WILL BE INSTALLED WHEREVER A CONSTRUCTION ACCESS ROAD INTERSECTS ANY PAVED ROADWAY. SAID ENTRANCE WILL BE COMPOSED OF 1" TO 2-1/2" DIAM. CRUSHED-STONE, BED OF 8" IN DEPTH, 20' WIDE (OR THE WIDTH OF THE EXISTING DRIVEWAY, WHICHEVER IS LESS,) AND LENGTH OF 40. IT SHOULD BE UNDERLAIN WITH A SUITABLE SYNTHETIC SEDIMENT FILTER FABRIC AND MAINTAINED.
4. ALL SOIL WASHED, DROPPED, SPILLED OR TRACKED OUTSIDE THE LIMIT OF DISTURBANCE OR ONTO PUBLIC RIGHT-OF-WAYS, WILL BE REMOVED IMMEDIATELY. PAVED ROADWAYS MUST BE KEPT CLEAN AT ALL TIMES.
5. CATCH BASIN INLETS WILL BE PROTECTED WITH A DRAINAGE FILTER. SEE DRAINAGE FILTER DETAIL.
6. DEWATERING OPERATIONS MUST DISCHARGE DIRECTLY INTO A SEDIMENT CONTROL BAG OR OTHER APPROVED FILTER.
7. DUST SHALL BE CONTROLLED VIA THE APPLICATION OF WATER.
8. A COPY OF THE CERTIFIED SOIL EROSION AND SEDIMENT CONTROL PLAN SHALL BE AVAILABLE AT THE PROJECT SITE THROUGHOUT CONSTRUCTION.
9. ALL PREVENTATIVE AND REMEDIAL MAINTENANCE WORK, INCLUDING CLEAN OUT, REPAIR, REPLACEMENT AND REGRADING MUST BE PERFORMED IMMEDIATELY. IF EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES (BMPs) FAIL TO PERFORM AS EXPECTED, REPLACEMENT BMPs, OR MODIFICATIONS OF THOSE INSTALLED WILL BE REQUIRED.

DRAINAGE FILTER FAB

NOT  
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3. F  
V  
4. T  
5. C



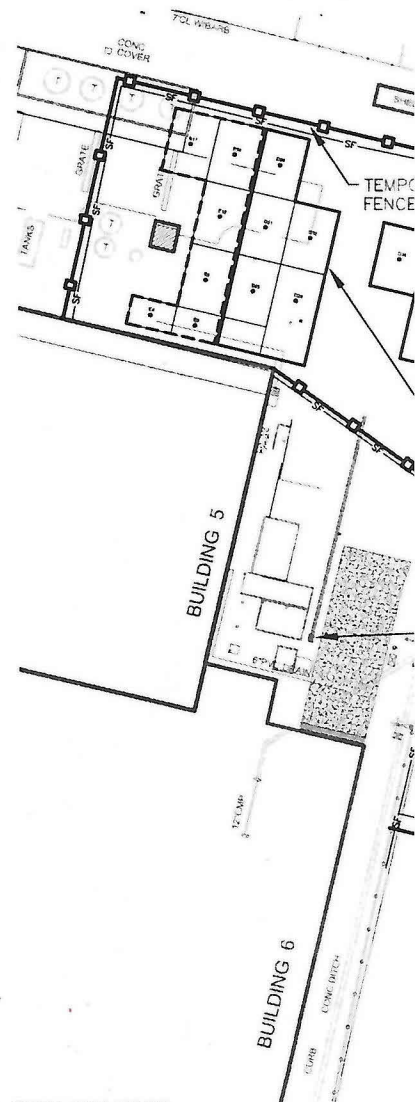
SILT FENCE DETAIL

### NOTES:

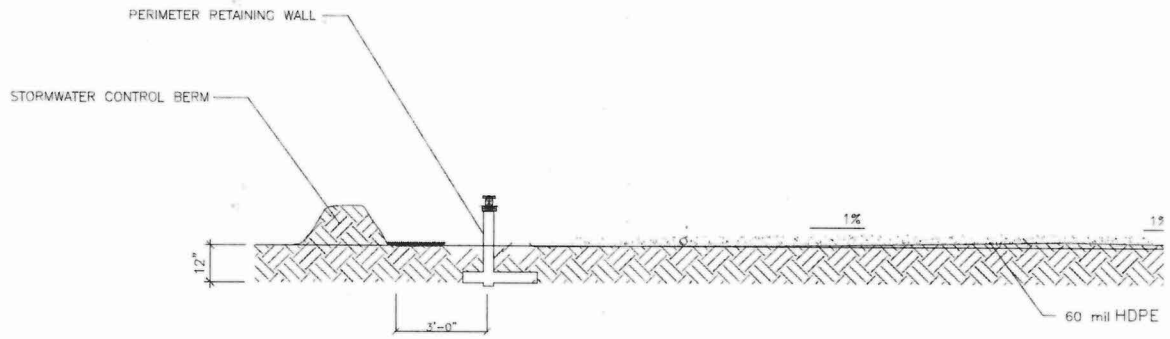
1. SILT FENCES SHALL BE PLACED DOWNGRADE OF ALL DISTURBED AREAS. SILT FENCES SHALL BE REINFORCED WITH HAY BALES.
2. SEDIMENT SHALL BE REMOVED FROM THE UPSTREAM FACE OF THE BARRIER WHEN IT HAS REACHED A DEPTH OF 1/2 THE BARRIER HEIGHT.
3. REPAIR OR REPLACE FABRIC WHEN DAMAGED.
4. BARRIERS SHALL BE INSPECTED DAILY FOR SIGNS OF DETERIORATION AND SEDIMENT REMOVAL.

### LEGEND

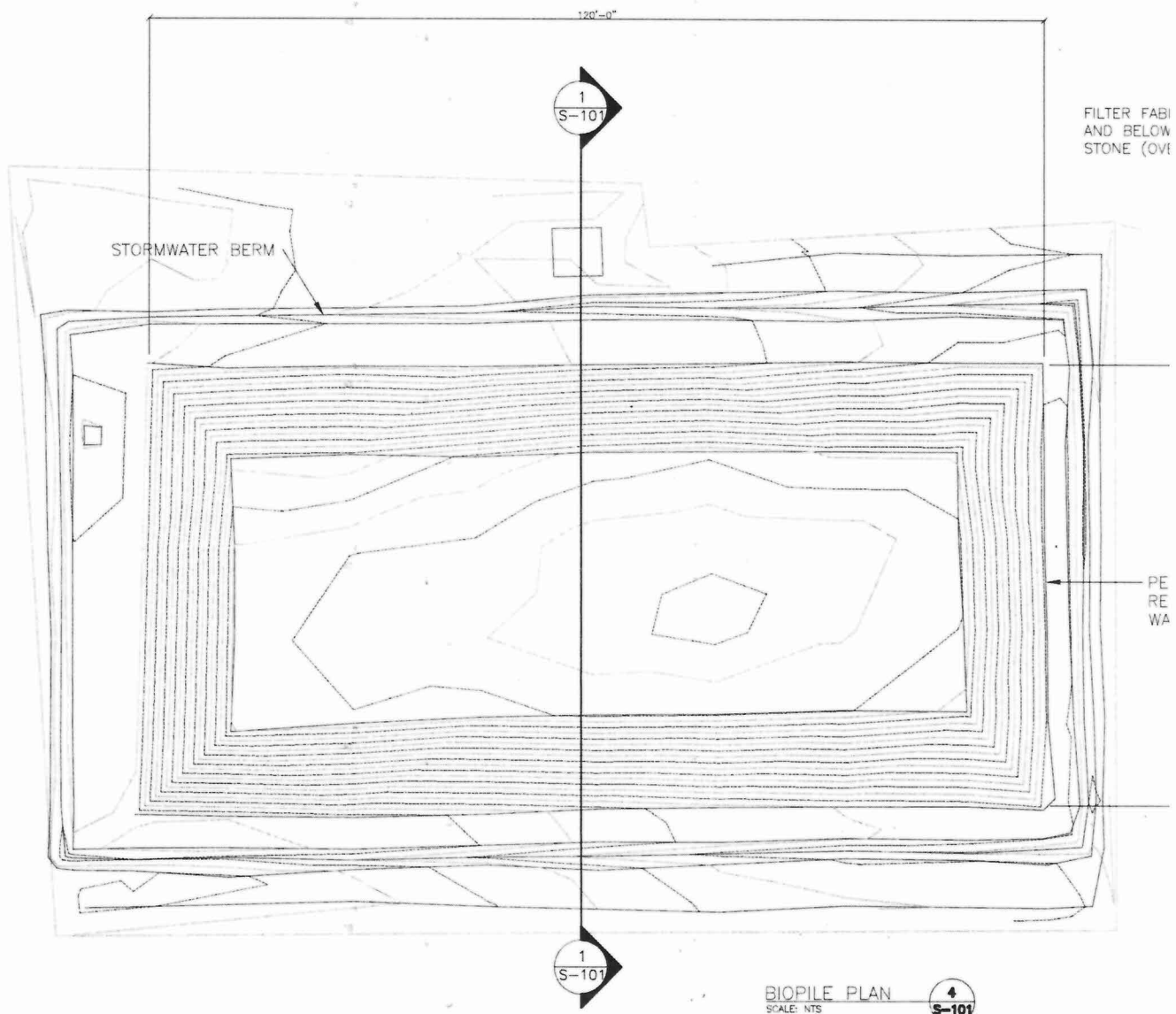
- CHAIN LINK FENCE
- SF — SILT FENCE
- [ ] — TEMPORARY FENCE
- - - - - FENCE TO BE REMOVED

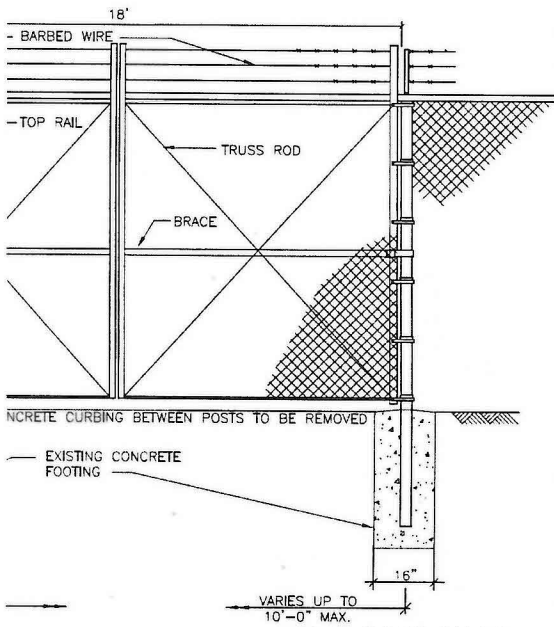






SECTION BIOPILE 1  
SCALE: NTS





GATE POST DETAIL.

DETAIL



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Approved by

Customer Representative mm/dd/yy

Drafter mm/dd/yy

Project Manager, mm/dd/yy

Engineering Manager mm/dd/yy

Quality Assurance mm/dd/yy

Rev	Date	Description	By
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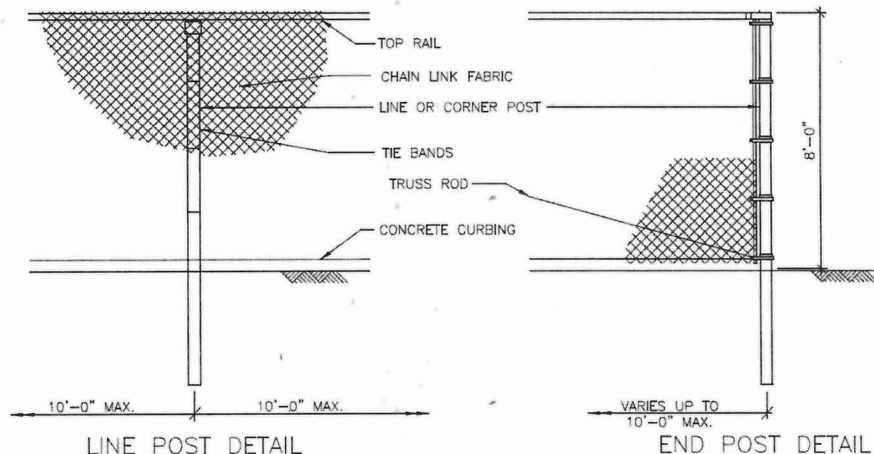
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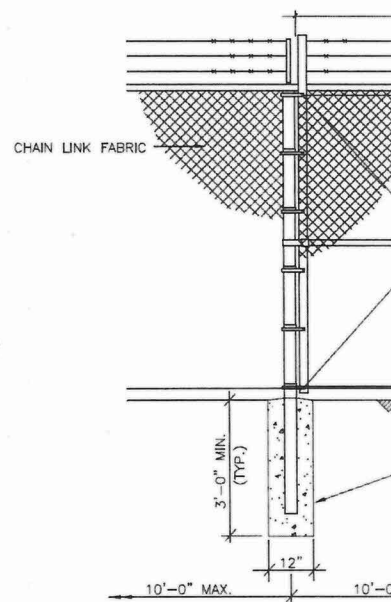
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VENDOR PROJECT NUMBER:	
AUTHOR:	
DISCIPLINE:	
SYSTEM:	
SYSTEM #:	
EQUIPMENT:	



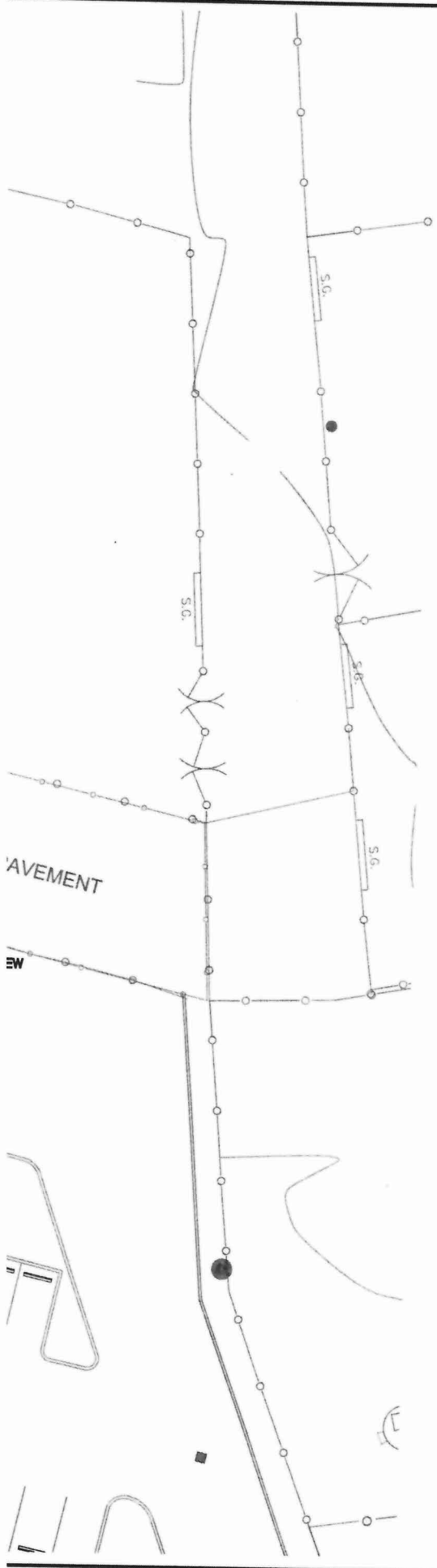


TEMPORARY CONSTRUCTION  
FENCE DETAIL  
SCALE: NTS



GATE POST DETAIL

NEW TEMPORARY SECURITY  
SCALE: NTS



**LEGEND**

- CHAIN LINK FENCE
- TEMPORARY FENCE

0 15 30  
SCALE IN FEET



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**Approved by**

Customer Representative mm/dd/yy  
Drafter mm/dd/yy  
Project Manager mm/dd/yy  
Engineering Manager mm/dd/yy  
Quality Assurance mm/dd/yy

Rev	date	Description	by
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**EXCAVATION PLAN**

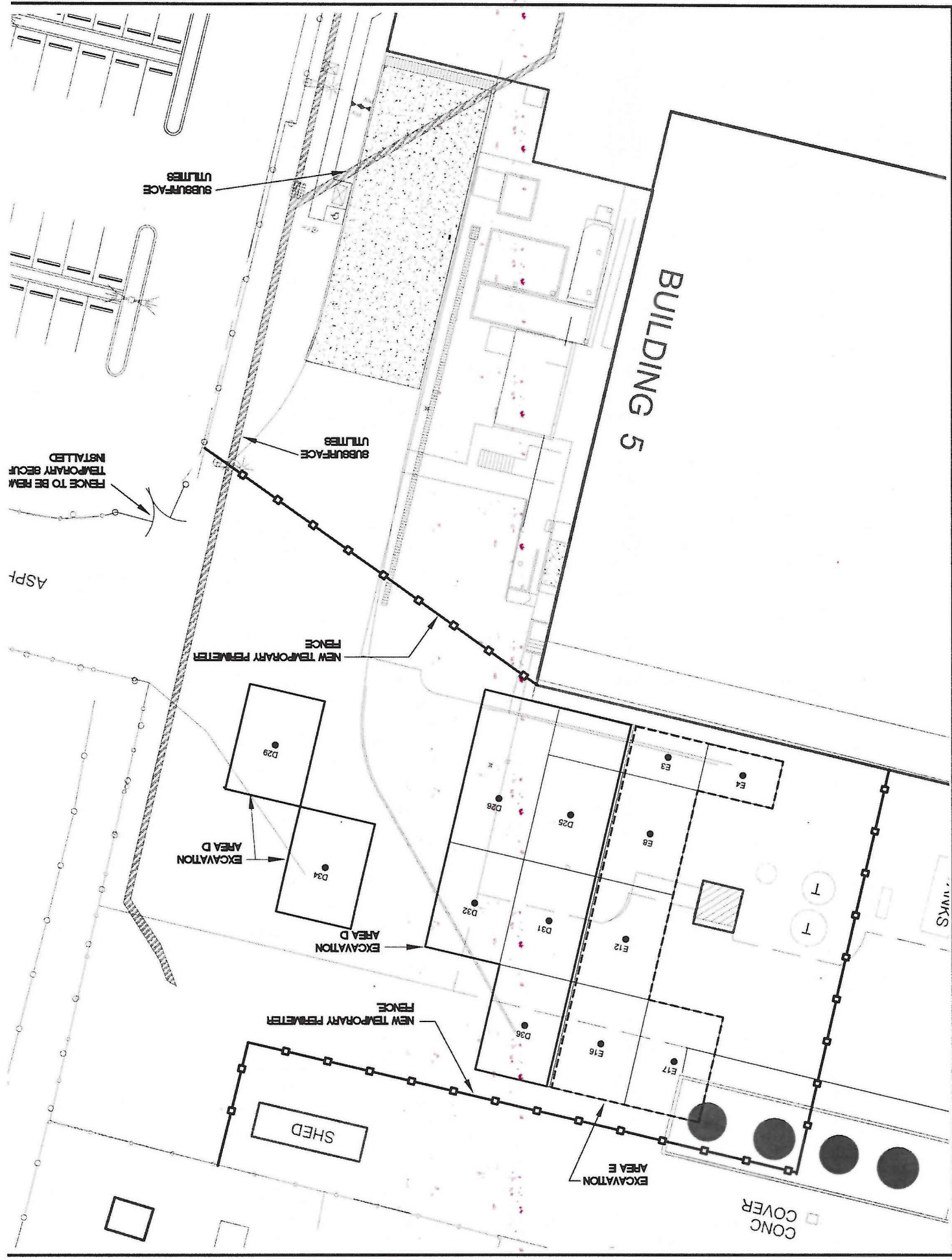
**PROJECT SOIL REMOVAL AND REMEDIATION**

Location:

DATE: 04/10/12 SHEET #: H-101  
SCALE: CAD FILE NAME  
PRJ MGR:  
DESIGNER:  
VENDOR NAME:  
VENDOR PROJECT NUMBER:  
AUTHOR:  
DISCIPLINE:  
SYSTEM:  
SYSTEM #:  
EQUIPMENT:









**LEGEND:**

- CENTER LINE
- CHAIN LINK FENCE
- ===SS=== STORM SEWER LINE
- 50.00 CONTOUR LINE
- △ STA-2 BASE LINE STATION
- MANHOLE
- C.O. CLEAN-OUT
- ▶ PIV POST-INDICATOR VALVE
- CATCH BASIN
- 20.00 X SPOT ELEVATION

**NOTE:**

CONTRACTOR TO FURNISH AND INSTALL BIOPILE GAS SAMPLING PROBES AS SHOWN ON P-103.

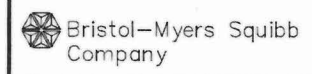


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Project Manager	mm/dd/yy
Engineering Manager	mm/dd/yy
Quality Assurance	mm/dd/yy

Rev	Date	Description	By



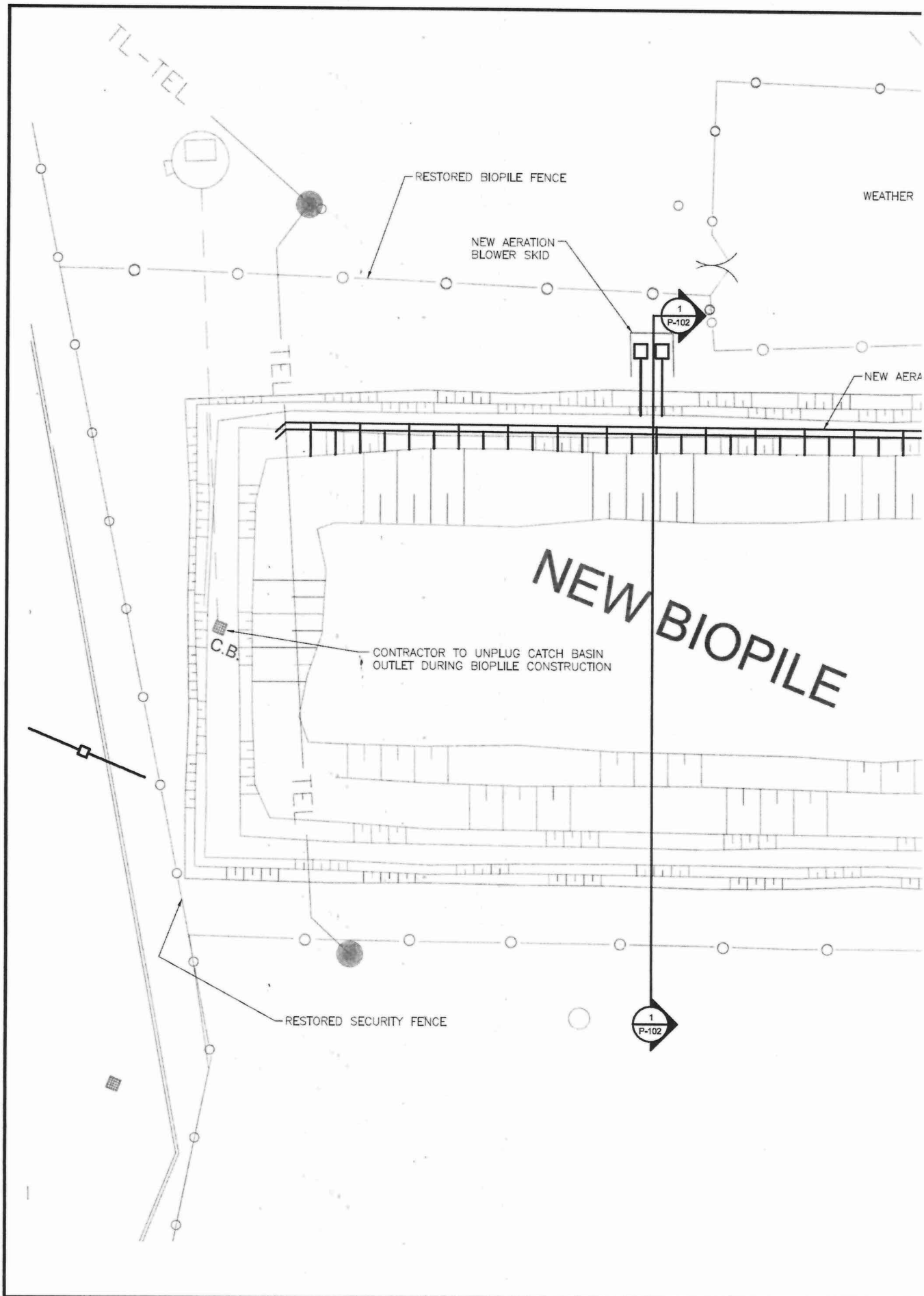
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**project:** SOIL REMOVAL AND REMEDIATION

**location:**

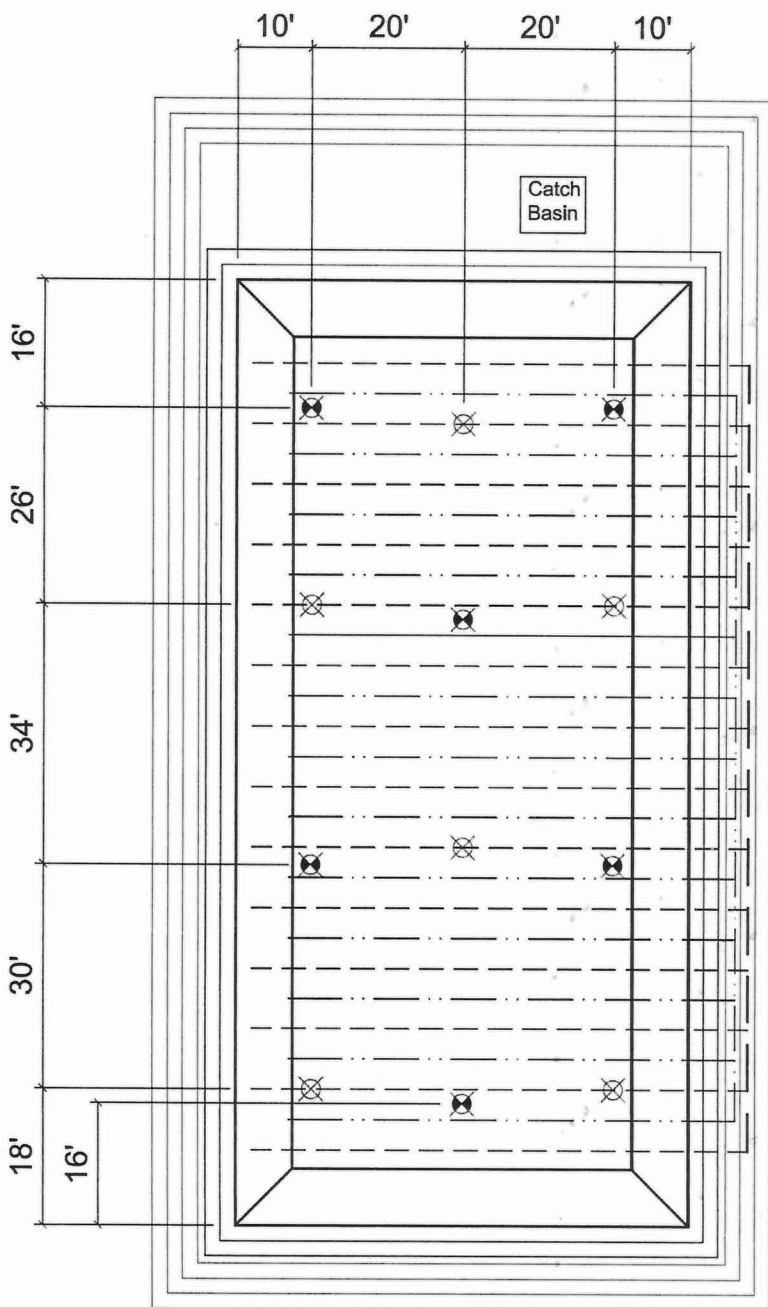
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<b>SCALE:</b>		P-101
<b>PRJ MGR:</b>		<b>CAD FILE NAME:</b>
<b>DESIGNER:</b>		
<b>VENDOR NAME:</b>		
<b>VENDOR PROJECT NUMBER:</b>		
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<b>SYSTEM:</b>		
<b>SYSTEM #:</b>		
<b>EQUIPMENT:</b>		











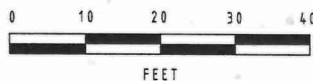
## LEGEND

--- Lower aeration pipes

--- Upper aeration pipes

⊗ Gas sample probe 4 feet below top of pile.

⊗ Gas sample probe 7 feet below top of pile. Must be minimum 1 feet above bottom of contaminated material.



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Project Manager mm/dd/yy

Engineering Manager mm/dd/yy

Quality Assurance mm/dd/yy

Rev.	Date	Description	By
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Bristol-Myers Squibb Company

10124 BIOPILE GAS SAMPLING PROBES

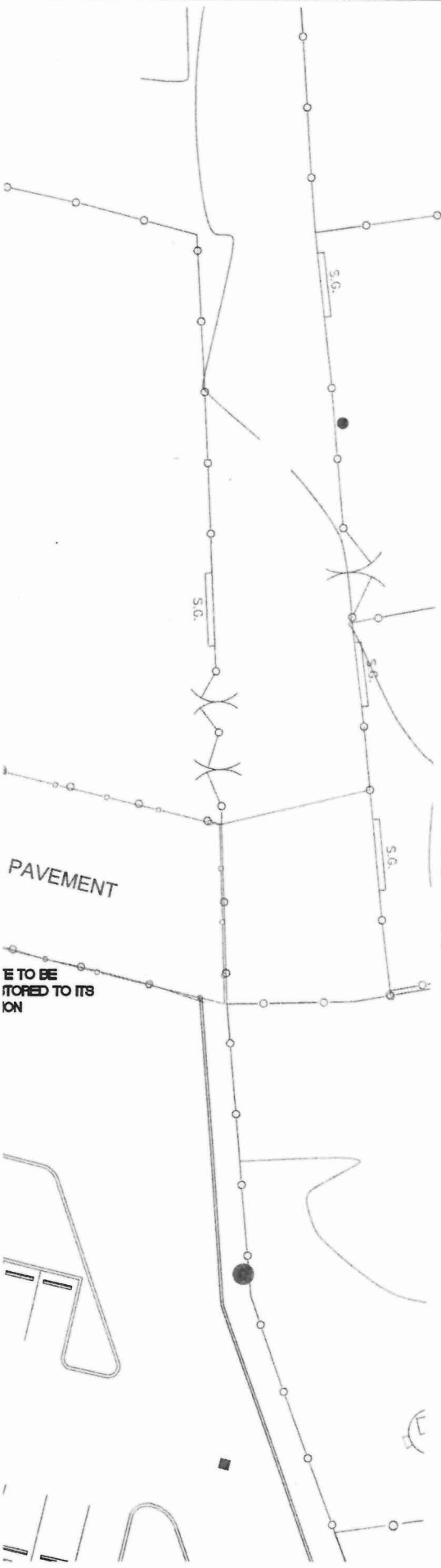
project: SOIL REMOVAL AND REMEDIATION

location:

DATE: 04/10/12	SHEET #:
SCALE:	P-103
PRJ MGR:	CAD FILE NAME
DESIGNER:	
VENDOR NAME:	
VENDOR PROJECT NUMBER:	
AUTHOR:	
DISCIPLINE:	
SYSTEM:	
SYSTEM #:	
EQUIPMENT:	







**NOTES:**  
 1. TEMPORARY FENCE IN MAIN EMPLOYEE PARKING LOT TO BE REMOVED. FENCE POST HOLES TO BE FILLED WITH CONCRETE.  
 2. FENCE REMOVED AT BIOPILE TO BE RESTORED TO ITS PRE-REMEDIATION CONDITION.

**LEGEND**

- CHAIN LINK FENCE
- TEMPORARY FENCE

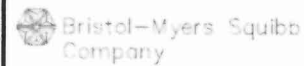


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**Approved by**

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 Drafter      mm/dd/yy  
 Project Manager      mm/dd/yy  
 Engineering Manager      mm/dd/yy  
 Quality Assurance      mm/dd/yy

Rev	A	Date	Description	by
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**Title:** RESTORATION PLAN

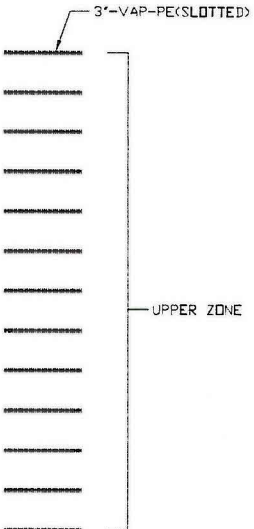
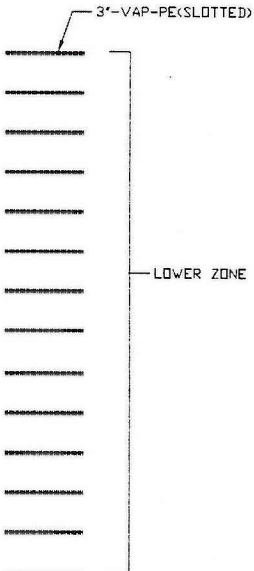
**Project:** SOIL REMOVAL AND REMEDIATION

**Location:**

<b>DATE:</b> 04/10/12	<b>SHEET #:</b> H-501
<b>SCALE:</b>	<b>CAD FILE NAME:</b>
<b>PRJ MGR:</b>	
<b>DESIGNER:</b>	
<b>VENDOR NAME:</b>	
<b>VENDOR PROJECT NUMBER:</b>	
<b>AUTHOR:</b>	
<b>DISCIPLINE:</b>	
<b>SYSTEM:</b>	
<b>SYSTEM #:</b>	
<b>EQUIPMENT:</b>	

0 15 30  
 SCALE IN FEET





**LEGEND:**

PE	POLYETHYLENE PIPE
PVC	POLYVINYL CHLORIDE PIPE
PI	PRESSURE INDICATOR
TI	TEMPERATURE INDICATOR
	BLOWER
	BALL VALVE
	FLEXIBLE HOSE
	REDUCER
	SAMPLE TAP
	BUTTERFLY VALVE
	LOCALLY MOUNTED
	UPPER ZONE
	LOWER ZONE
	PROCESS PIPING IDENTIFICATION



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**Approved by**

Customer Representative	mm/dd/yy
Drafter	mm/dd/yy
Project Manager	mm/dd/yy
Engineering Manager	mm/dd/yy
Quality Assurance	mm/dd/yy

Rev	Date	Description	By
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Bristol-Myers Squibb Company

Title: PROCESS AND INSTRUMENTATION DIAGRAM

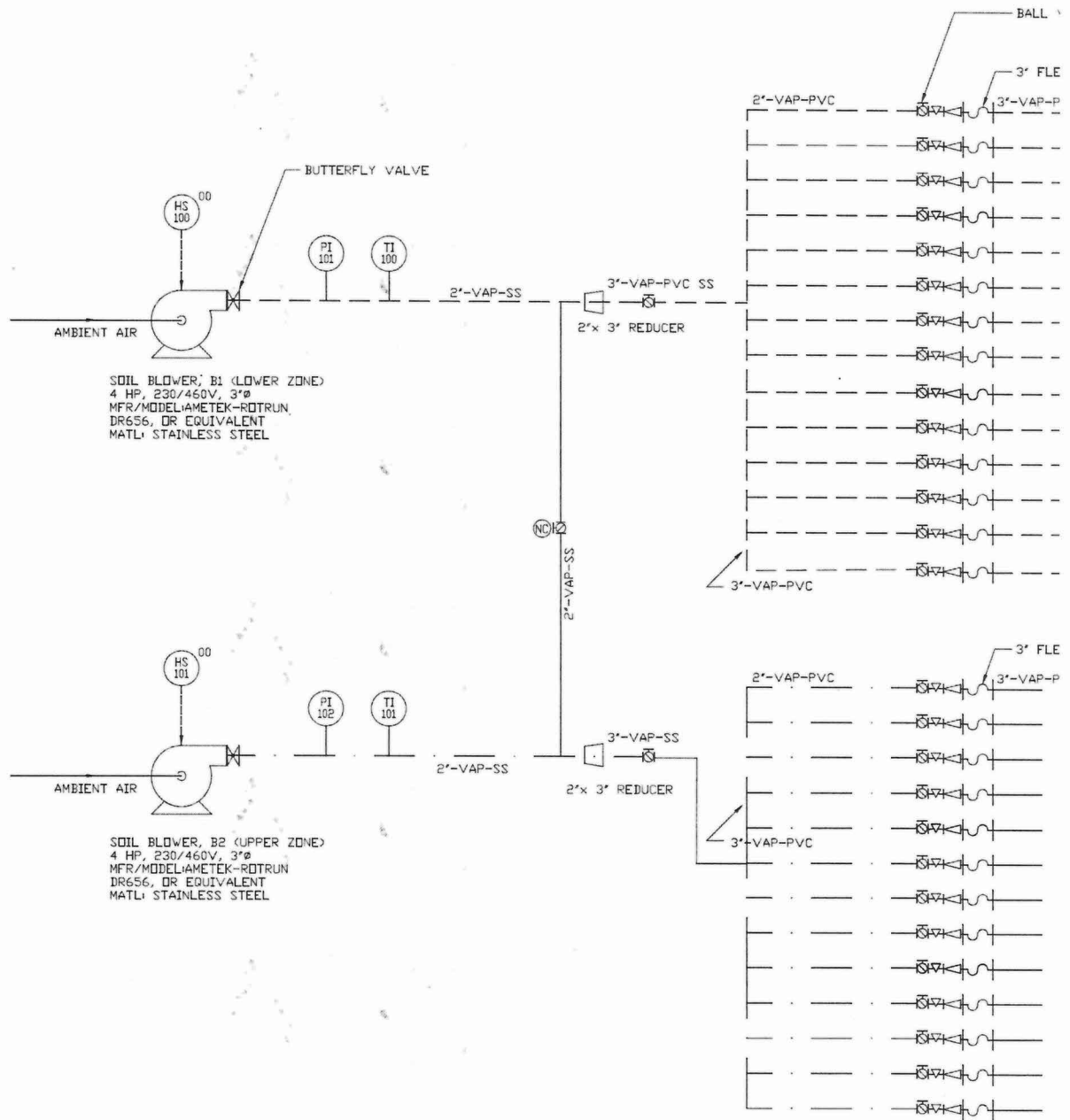
Project: SOIL REMOVAL AND REMEDIATION

Location:

DATE: 04/10/12	SHEET #:
SCALE:	P&ID-001
PRJ MGR:	CAD FILE NAME
DESIGNER:	
VENDOR NAME:	
VENDOR PROJECT NUMBER:	
AUTHOR:	
DISCIPLINE:	
SYSTEM:	
SYSTEM #:	
EQUIPMENT:	

**NOTE:**

1. BLOWER SYSTEM WILL BE PROVIDED BY THE OWNER, AND WILL CONSIST OF TWO AMETEK-ROTRON, MODEL NUMBER DR-656 4-HP, SINGLE-STAGE REGENERATIVE BLOWERS, MAXIMUM 210 SCFM @ 106" OF WATER COLUMN. OWNER WILL PROVIDE THE SKID-MOUNTED BLOWERS.
2. SKID-MOUNTED BLOWERS WILL INCLUDE A CONTROL PANEL IN A NEMA 4X ENCLOSURE SUITABLE FOR 480V-3 PHASE SUPPLY EQUIPPED WITH COMBINATION TYPE MAGNETIC MOTOR, STARTER AND START/STOP PUSH BUTTONS FOR MANUAL CONTROL OF BLOWER.



## ***Appendix J***

### ***Temporary Unit Operations and Maintenance Plan***



**Bristol-Myers Squibb Manufacturing Company**

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***Temporary Unit Operations and  
Maintenance Plan***

***Bristol-Myers Squibb Manufacturing Company  
Humacao, Puerto Rico***

***May 2012***



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**Anderson Mulholland & Associates**  
ENVIRONMENTAL CONSULTANTS



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## Attachments

A	Engineering Drawings of Temporary Unit
B	Biopile Monitoring Forms

## **1 Introduction**

Bristol-Myers Squibb Manufacturing Company (BMSMC) is currently implementing a RCRA Corrective Action Program at its pharmaceutical manufacturing facility located in Humacao, Puerto Rico. The Corrective Action Program is being conducted in accordance with Module III of BMSMC's RCRA Hazardous Waste Treatment and Storage Permit No. PRD090021056.

As part of the RCRA Corrective Action Program, BMSMC is implementing an Interim Corrective Measure (ICM) at the Building 5 Area, designated by United States Environmental Protection Agency (USEPA) as Solid Waste Management Unit (SWMU) No. 20. The soil remedy for the Building 5 Area consists of excavation and onsite treatment of impacted soil by ex situ bioremediation. After treatment, soil is either reused onsite as backfill or is sent off site for disposal at an industrial landfill. The ICM is being implemented in accordance with an Interim Corrective Measure Work Plan, Building 5 Area, May 2012 (ICM Work Plan).

Impacted soil treatment involves placement of excavated soil into a soil treatment unit, covering the soil pile, and aeration of the soil until pre-determined soil treatment standards are achieved. The soil treatment unit, which satisfies the definition of a tank under 40 CFR §260.10, will be constructed in accordance with the specification set forth in the ICM Work and ICM Design Plan. The soil treatment unit is classified as a Temporary Unit pursuant to §264.553.

This document presents the procedures for proper operation, maintenance and closure of the Temporary Unit (TU). Section 2 provides a detailed description of the design and construction of the unit. Procedures for operation and maintenance of the unit are presented in Section 3. Procedures for closure of the unit are provided in Section 4.

## 2 Temporary Unit Design

### 2.1 General Description

The Temporary Unit consists of a single soil treatment cell with dimensions of 60 ft by 120 ft with a capacity of treating up to 1,900 cubic yards of soil. The treatment cell is provided with a low permeability liner and is surrounded by an 18-inch high by 6 inch thick reinforced concrete wall. The unit satisfies the definition of a tank at §260.10 because it is a stationary device designed to contain an accumulation of hazardous waste which is constructed primarily of non-earthen materials which provide structural support. The soil treatment cell is surrounded by a lined and bermed channel for the collection of storm water falling within the TU. **Figure 1** presents a plan of the soil treatment unit. **Figure 2** presents cross sections and details of the soil treatment unit when filled to capacity with impacted soil. **Appendix A** contains related engineering drawings. The soil treatment unit is also referred to as a “Biopile” when filled with soil.

Soil treatment is performed by ex-situ bioremediation which involves stimulating aerobic microbial activity within the soil through aeration. The microbes are present in the natural soil and no additional microbes are added to the soil. The aerobic microbial activity degrades the organic contaminants adsorbed to soil particles, thus reducing the concentrations of these contaminants. Aerobic microbes require oxygen to degrade hydrocarbons resulting in the production of CO<sub>2</sub> and water. The soil treatment cell has been designed and constructed to ensure that optimum conditions exist for aggressive biodegradation of organic constituents of concern, including adequate oxygen, moisture, and nutrient levels.

### 2.2 Waste Characteristics

The TU is used only for the treatment of remediation waste as defined at §260.10. Remediation waste in this case includes hazardous soil excavated as part of the RCRA Corrective Action Program. A description of the chemical and physical characteristics of the remediation waste is presented in this section.

Subsurface soil at the Building 5 Area was impacted by a release of hazardous process wastewater from underground transfer lines. The released waste was classified as F003/F005. Therefore, contaminated soil will be managed as F003/F005 until it no longer contains hazardous waste. The constituents of concern (COCs) in soil at the Building 5 Area were identified during the RCRA Facility Investigation and include xylenes, ethylbenzene, methyl isobutyl ketone (MIBK), acetone, toluene, and methanol. The soil does not exhibit the characteristics of ignitability, corrosivity, reactivity, or toxicity. Soil placed in the TU does not contain free liquids. Based on analytical results from previous soil investigations, the maximum

concentration of each COC expected to be treated in the Biopile is provided below.

COC	Maximum Detected Concentration
	(mg/kg)
Xylenes	5,500
Ethylbenzene	1,710
MIBK	1,080.
Acetone	346
Toluene	444
Methanol	3,700

## **2.3 Temporary Unit Components**

### **2.3.1 Liner System**

The soil treatment cell consists of a single cell with dimensions of 60 ft by 120 ft. The cell is lined with a 60-mil flexible membrane liner (FML). The liner is placed on graded and compacted native soil. Installation of the FML, including rollout, spreading, and field seaming was conducted in accordance with manufacturer's specifications. The cell is surrounded by an 18-inch high, 6-inch thick reinforced concrete wall, which is also lined with the FML.

Storm water falling within the treatment unit is channeled via a lined storm water collection channel to a sump from which point it is conveyed to the BMSMC storm water collection system. The storm water collection channel extends along the entire perimeter of the treatment cell and is bound on the inside by the concrete wall described above and the outside by an 18-inch high earthen berm. This earthen berm also prevents run on of storm water from surrounding areas. Further details on the liner system and associated storm water system are presented in **Figures 1 and 2** and **Attachment A**.

The TU is provided with a leachate collection system for the removal of any free liquids that may be present within the soil pile. The leachate collection system consists of a 6-inch thick gravel layer placed on top of the FML. The gravel layer is covered by a layer of geotextile fabric to prevent soil fines from migrating into the gravel layer.

### **2.3.2 Aeration System**

The aeration system is designed to allow the continued introduction of air into the pile such that approximately one pore volume of air is replaced daily. The aeration system is designed and operated in the air injection mode. In this mode, off-gas is not generated at a point.

The soil treatment cell aeration system includes two regenerative blowers, two pipe manifolds, and twenty seven valves and slotted flexible pipes passing through the soil pile perpendicular to the longitudinal axis of the treatment unit. The slotted aeration pipes are capped at the ends and

are covered with a fabric filter to prevent clogging by soil fines. Pipes are installed at two alternating levels within the pile to facilitate aeration throughout. During each phase of the project, new flexible slotted pipes will be installed during soil placement.

### **2.3.3 Cover System**

The TU cover system consists of a geotextile fabric material to cover the impacted soil undergoing treatment overlain by a 30 mil LLDPE plastic sheeting. The geotextile fabric serves as the primary cover to prevent impacted soil from being exposed to the environment and direct human contact. The fabric cover allows both air to pass out of the TU, and rain water to enter. The 30 mil plastic sheeting overlying the fabric cover serves to anchor the fabric over the TU as it is secured to treated lumber along the perimeter berm. The plastic sheeting is installed with 2-inch diameter holes equidistantly spaced two feet apart to allow air to escape from the TU and prevent excessive rainwater intrusion during storm events.

### **3 Operations and Maintenance**

#### **3.1 Soil Placement**

Impacted soil is placed in the treatment cell using front end loaders or other appropriate equipment. Soil is piled to a maximum height of 10 feet. Earth moving equipment will not be permitted to pass over soil already placed in the treatment cell. Soil processing is limited to the blending of nutrients and moisture, if necessary, and limited premixing to increase soil homogeneity. BMSMC implements a sediment and erosion control plan to minimize pollutants in storm water runoff.

After blending of any amendments that are required, the loader places the soil onto the TU. After construction, 12 air monitoring probes consisting of 2-inch diameter gravel filled, nylon suction strainers are installed at different depths and in different areas of the Biopile to allow monitoring of oxygen concentrations during operation as shown in the design drawings.

A health and safety plan has been prepared by BMSMC that outlines engineering controls, personnel protective equipment and emergency response procedures to be followed during placement of impacted soil into the treatment cell. The procedures in the health and safety plan are followed by site workers and BMSMC personnel to minimize exposure to impacted soil during placement.

#### **3.2 System Startup, Operation, and Maintenance**

This section describes startup, operation, and maintenance procedures that have been developed to ensure that all Biopile components have been properly installed and that routine maintenance procedures will be followed during operation of the system.

##### **3.2.1 System Startup**

After completion of impacted soil placement and cover system installation, and inspection of all Biopile components, the blower is started and balancing of the aeration system is conducted. Air flow will initially be adjusted by fully opening the flow-control valve at each aeration leg. Valves at each aeration leg are adjusted such that all legs are open the same amount. Using an air flow meter such as a pitot tube or hot-wire anemometer, air flow is adjusted at each leg. The valves are closed to a point that equals the design flow for each leg. When all aeration legs have been equalized, the system will be considered balanced.

After balancing air flow, soil gas oxygen concentration will be measured at each monitoring point for several hours until it becomes stabilized. After stabilization, the valves controlling flow to the aeration legs will be adjusted, if necessary, such that the oxygen level is equal to a minimum of 15% from each soil gas monitoring point.



A shutdown respiration test is performed during the startup period to allow estimation of the rate of microbial activity and to determine if the Biopile is oxygen limiting. The test commences after the soil has been fully aerated (24 to 48 hours after turning on the blower). The test is performed by turning off the blower and collecting soil gas samples. Soil gas samples are field tested for O<sub>2</sub> and CO<sub>2</sub> at 2, 4, 6, and 8 hours and then every 4 to 12 hours until stabilization, depending on the rate at which oxygen is being utilized.

### **3.2.2 Operation and Maintenance**

The objective of routine maintenance is to perform visual inspections of the TU and to monitor TU operations. Routine operation and maintenance is performed in accordance with the schedule presented in **Table 1**.

The berms, cover system, security fence and storm water collection system are visually inspected each week. Weekly inspections also include ambient air monitoring in the vicinity of the treatment cell to ensure that emissions from the soil do not pose a health and safety hazard to site workers or member of the public. Mechanical equipment including the blower, valves and gauges is visually inspected weekly. Weekly inspections ensure that proper blower operation and design airflow is maintained. To accomplish this goal, air measurements are taken to assess the potential for obstructions to the blower system. Weekly inspection forms are presented in **Attachment B**.

During the first month of each phase of operation, the treatment unit is weekly monitored for gas concentrations. Gas measurements including O<sub>2</sub> and CO<sub>2</sub> are taken at each of the 12 probes to ensure proper Biopile operation. The soil gas monitoring form is included in **Attachment B**.

During monthly inspections, air flow measurements and soil gas concentrations are collected from each monitoring point to evaluate proper operation. If the oxygen concentration at any aeration leg is below 15%, the airflow to that leg is adjusted so that it is between 15 to 20% to the extent practicable.

Quarterly soil sampling is conducted to allow an assessment of Biopile effectiveness. Details regarding soil sampling are discussed in the following section.

### **3.3 Performance Testing**

Soil samples are collected from the Biopile at a minimum frequency of every three months in order to monitor progress of soil treatment and to ensure that soil has achieved performance criteria discussed below. The surface of the Biopile is divided into a grid comprising eight cells of approximately 750 ft<sup>2</sup> each. Each of the eight cells is further subdivided into nine smaller, equally-sized subcells. A soil sample is collected at the center of one of the nine subcells as determined randomly. For each subsequent sampling event, a new random sampling location

will be generated. Sample depth intervals alternate between adjacent cells at 2-2.5 feet and at 6-6.5 feet below the top of the Biopile.

Soil samples will be collected using direct push sampling methods. Samples will be collected, handled, analyzed, validated, and evaluated according to the procedures in the 2012 project quality assurance project plan (QAPP). Samples will be analyzed by Accutest Laboratories (Accutest) of Dayton, New Jersey for the following COCs:

COC	Analytical Method
Acetone	SW846 – Method 8260B
Ethylbenzene	SW846 – Method 8260B
Toluene	SW846 – Method 8260B
Xylene <sup>1</sup>	SW846 – Method 8260B
MIBK	SW846 – Method 8260B
Methanol	SW846 – Method 8015C

Samples will be collected, handled, analyzed, validated, and evaluated according to the procedures in the 2012 quality assurance project plan (QAPP) (AMAI, 2012). Soil analytical results will be compared to the soil treatment standards discussed below.

### 3.4 Soil Treatment Standards

Soil is treated to a level which ensures the soil no longer contains hazardous waste and that future management will not pose unacceptable risks to human health or the environment. Treated soil is either transported off-site for disposal in a RCRA Subtitle D industrial landfill or is reused onsite as fill material. Treatment levels to be achieved are provided in the **Table 2**.

### 3.5 Treated Soil Removal

Upon achievement of soil standards described above, treated soil is removed from the treatment facility. It is anticipated that soil removal takes place concurrently with the subsequent phase of soil excavation. Treated soil is managed in one of the following manners:

- If Tier 1 standards are achieved for all COCs tested but Tier 2 standards are not achieved, soil is sent off-site to an approved industrial landfill

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<sup>1</sup> Represents the total concentration of the o-, m-, and p-xylene isomers

- If Tier 2 standards are achieved for all COCs tested, soil may be reused onsite without restriction, possibly as backfill during the subsequent excavation phase, or the soil may be transported off-site to an approved industrial landfill.

If performance testing described in **Section 3.3** indicates soil treatment standards have not been achieved in a particular cell and depth interval of the Biopile, soil from the cell represented by the sample may be set aside and placed back into the treatment facility with soil from the subsequent phase for further treatment. If Tier 1 standards are not achieved, soil will be managed as hazardous waste.

The final disposition of treated soil will be provided to USEPA in the report to be prepared at completion of treatment.

### **3.6 Security**

Access to the treatment facility is controlled by a perimeter fence 12 feet in height with barbed wire and a locked slider gate allowing entry by only authorized BMSMC personnel. Security perimeter fence details are shown in **Attachment A**.

A sign is posted at the entrance to the treatment facility clearly indicating that access is permitted by authorized personnel only. BMSMC also maintains a 24-hour security system consisting of surveillance cameras and guards preventing access to the facility by unauthorized personnel.

### **3.7 Contingency Plan**

A Contingency Plan was prepared by BMSMC as part of the RCRA Part B permit application and has been incorporated into the RCRA Permit. The Contingency Plan provides the emergency procedures to be followed in the event of an accidental release of hazardous waste. If a release of hazardous waste occurs at the TU, the provisions of the Contingency Plan will be applied. Copies of the Contingency Plan are maintained by BMSMC personnel at the facility.

## **4 Temporary Unit Closure Plan**

This section presents the Closure Plan for closure of the TU in accordance with 40 CFR Subpart G.

### **4.1 Closure Performance Standard**

Upon completion of all soil treatment activities, closure will be implemented in a manner that satisfies the closure performance standards set forth at 40 CFR §264.111. A description of how these performance standards will be achieved is provided below:

- Closure will minimize the need for further maintenance and controls. As described below, all structures and equipment that had been used for the transfer, storage, and treatment of impacted soil will be decontaminated, dismantled, and/or removed from the site.
- Closure will protect human health and the environment. Upon completion of closure, all sources of hazardous constituents will have been decontaminated and/or removed from the facility, thereby minimizing the potential for exposure to humans or the environment.
- Closure will control the release of hazardous waste constituents, leachate, contaminated rainfall, and waste decomposition products to ground, surface water, and the atmosphere. Proper decontamination and removal of contaminated structures and equipment from the site will minimize the potential for hazardous constituent migration from the area.

### **4.2 Maximum Waste Inventory**

The TU is designed to treat a maximum of 1,900 cubic yards of hazardous waste (i.e., impacted soil) at any given time.

### **4.3 Closure Procedure**

Closure activities will include removal of treated soil and soil residue, dismantling of the liner system, aeration equipment, and ancillary facilities, decontamination and proper disposal of equipment, and testing of subsoil. Detailed procedures for carrying out closure activities are provided below.

All work will be conducted by a qualified contractor. The contractor will provide all labor, equipment, and supplies necessary to properly complete the closure. All personnel involved in closure activities who may be exposed to hazardous constituents will have completed appropriate OSHA health and safety training.

A work zone will be established around the perimeter of the TU. This work zone will also include staging and decontamination areas. The work zone will be clearly delineated with highly

visible signs, cones and/or warning tape and will be off limits to all personnel except those involved in closure activities. The work zone will be divided into three areas – the Hot Zone, the Contamination Reduction Zone, and the Clean Zone. Zones will be delineated by the Field Supervisor in consultation with the closure contractor. The field team will be outfitted for their protection with appropriate personnel protective equipment. A Health and Safety Plan will be prepared by the closure contractor prior to commencement of field activities.

An independent, registered Professional Engineer (PE) will be contracted before closure activities begin. The PE must possess a current license to practice engineering and must have demonstrated experience in hazardous waste management issues. The PE will be present during all critical closure activities, including, but not limited to, decontamination of structures and equipment and dismantling of structures.

Based on successful performance of the soil treatment facility during three previous phases of the ICM, the closure procedures described below assume that performance testing of treated soil demonstrates that Tier 1 standards, as discussed in **Section 3.4**, have been achieved and that treated soil does not require management as hazardous waste. In this case, treated soil will be disposed of off-site at an approved RCRA Subtitle D industrial landfill (or will be reused onsite if Tier 2 standards are also achieved). Since the treated soil no longer requires management as hazardous waste, than any soil residue or structures or equipment, including liner, piping, and cover, that may have contacted the soil also do not require management as hazardous waste and will be disposed of in an industrial landfill. If performance testing of treated soil demonstrates that Tier 1 levels have not been achieved, thus requiring management as hazardous waste, then any soil residue or structures or equipment that may have contacted the soil will also require management as hazardous waste.

- Treated soil will be removed from the TU using suitable equipment and will be live loaded into trucks for transport to the selected industrial landfill. Components within the soil pile, including soil gas monitors, aeration piping, geotextile, and leachate collection system media will be co-disposed with the treated soil. The cover system will be carefully pulled back to expose only that section of the soil pile to be removed and will be replaced at the end of the working day.
- All soil residues remaining within the TU after removal of treated soil will be placed into appropriate containers and managed as nonhazardous waste. The containers will be shipped off-site to an approved industrial landfill for disposal.
- Contaminated system components such as the underlying liner, cover, and piping will be cut into smaller sections and placed in approved roll-off containers. The material will be

managed as nonhazardous waste and will be disposed of at an approved industrial landfill.

- Before removal, the liner will be visually inspected for tears, holes, gaps, or other damage that may have compromised their integrity.
- Decontamination of contaminated equipment, hand tools, and sampling equipment will consist of high pressure water wash or tap water rinse to remove residual solids, if necessary. Rinsate will be transferred to appropriate containers, tested, and managed as nonhazardous waste.
- All disposable sampling equipment and protective clothing that are contaminated will be containerized, tested, and managed as nonhazardous waste.

#### **4.4 Soil Sampling**

Upon removal of the liner, soil samples will be collected from the 0-6 inch interval immediately beneath the TU to determine whether operation of the unit has impacted underlying soil. Sample locations will be as follows:

A sample will be collected beneath each possible release point identified during inspection of the liner as described above.

The footprint of the TU will be divided into four quadrants. A soil sample will be collected at the approximate center of each quadrant.

Each soil sample will be analyzed according to the procedures discussed in **Section 3.3**. Samples will be collected, handled, analyzed, validated, and evaluated according to the procedures in the 2012 project QAPP. If COCs are detected at levels in excess of the soil screening levels provided in **Section 3.4**, a work plan for the delineation and removal, if necessary, of impacted soil will be provided to USEPA for approval.

#### **4.5 Closure Certification**

In accordance with §264.115, within 60 days of completion of closure, BMSMC will submit to USEPA and to the Puerto Rico Environmental Quality Board (EQB) a certification by an independent registered Professional Engineer that the TU was closed in accordance with the specifications in the approved Closure Plan and that all closure performance standards have been achieved.



#### **4.6 Closure Schedule**

BMSMC will notify USEPA and EQB at least 60 days prior to commencement of closure of the TU.

In accordance with §264.113, within 90 days of commencement of closure, waste inventory (i.e., treated soil) will be removed although BMSMC may elect to remove waste inventory from the TU prior to commencement of closure. Within 180 days of commencement of closure, all closure activities will be completed, including dismantling and off-site disposal of waste residues, structures, ancillary equipment, soil sampling, and decontamination of equipment and tools. The PE certification will be submitted within 60 days of completion of closure.

At this time, BMSMC does not anticipate the need for an extension of the 180-day limit for the completion of closure activities. However, if additional time is required to close the TU, a petition will be submitted in accordance with §264.113(b) to USEPA with a justification for requesting additional closure time.

## ***Tables***

**Table 1**  
**Temporary Unit Operation and Maintenance Procedures**

Bristol-Myers Squibb Manufacturing Company  
Humacao, Puerto Rico

Maintenance and Performance Testing Activity	Frequency
<ul style="list-style-type: none"> <li>Visual inspection of the berm, Biopile cover and tiedowns, blower and blower piping, storm water collection system, fence and gate, etc.</li> <li>Airflow measurements at each aeration leg</li> </ul>	Weekly
<ul style="list-style-type: none"> <li>Soil gas oxygen and CO<sub>2</sub> measurement</li> <li>Soil gas VOC measurement</li> <li>Ambient air VOC measurement</li> <li>Moisture content measurement</li> </ul>	Weekly for First Month
<ul style="list-style-type: none"> <li>Airflow measurements at each aeration leg</li> <li>Soil gas oxygen and CO<sub>2</sub> measurement</li> <li>Soil gas VOC measurement</li> <li>Ambient air VOC measurement</li> <li>Moisture content measurement</li> </ul>	Monthly
<ul style="list-style-type: none"> <li>Collection of soil samples for laboratory analysis of COCs</li> </ul>	Quarterly
<ul style="list-style-type: none"> <li>Collection of soil samples within the Biopile to determine pH, moisture content and nutrient content</li> </ul>	As Necessary
<ul style="list-style-type: none"> <li>Respiration testing</li> </ul>	As Necessary

**Table 2**  
**Temporary Unit Soil Treatment Standards**

Bristol-Myers Squibb Manufacturing Company  
Humacao, Puerto Rico

<b>COC</b>	<b>Tier 1<sup>2</sup></b>	<b>Tier 2<sup>3</sup></b>
	<b>Screening Level (mg/kg)</b>	<b>Screening Level (mg/kg)</b>
Acetone	1600	48
Benzene	100	0.052
Ethylbenzene	100	15.6
Toluene	100	13.8
Xylene <sup>4</sup>	300	196
MIBK	330	4.6
Methanol	7.5 mg/l (TCLP)	32

<sup>2</sup> Tier 1 Levels represent alternative land disposal restriction treatment standards for contaminated media (i.e., ten times the universal treatment standard) in accordance with 40 CFR §268.49(c)(1)(C).

<sup>3</sup> Tier 2 Levels represent migration to groundwater screening levels from USEPA Regional Screening Levels (November, 2011). Values shown are based on a dilution attenuation factor of 20.

<sup>4</sup> Represents the total concentration of the o-, m-, and p-xylene isomers